

A NEW SPECIES AND DISTRIBUTION RECORD FOR THE
GENUS *CAECULUS* DUFOUR (ACARI: CAECULIDAE)
FROM SOUTH DAKOTA

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Abstract.—*Caeculus lewisi*, a new species of the genus *Caeculus*, is described and illustrated. A new distribution record for the genus *Caeculus* is recorded for South Dakota along and a key to the species of the family Caeculidae is presented.

Key Words: *Caeculus*, rake-legged mites, distribution, fungus

During the course of ecological studies in the 1970's connected with the grassland International Biome Program, invertebrate fauna of grasslands in northwestern South Dakota was investigated. At that time, a new species of *Caeculus* was discovered. The dominant vegetation of the study area was comprised of buffalograss [*Buchloe dactyloides* (Nutt.) Engelm.], blue grama [*Bouteloua gracilis* (H.B.K.) Griffiths], and western wheatgrass [*Agropyron smithii* Rydb.]. Interspersed within the Pierre shale that supports these dominant grasses were outcrops of coarser-textured soil on which species more characteristic of tall-grass prairies were found. The most abundant grasses on these outcrops were big bluestem (*Andropogon gerardii* Vitman), little bluestem (*Andropogon scoparius* Michx.), Indiangrass [*Sorghastrum nutans* (L.) Nash], and switchgrass (*Panicum virgatum* L.). Field observations of this new species of mite suggested it was feeding on phlox (*Phlox* sp.) plants that were growing on the outcrops. No specimens of this new species were collected in the short-grass dominated areas surrounding the outcrops. However, observations of collected mites studied with a dissecting microscope revealed they were

feeding on a fungus associated with the phlox stems. Similar studies of other plants collected from the rocky outcrop confirmed that this species of *Caeculus* feeds on fungal spores. Crossley and Merchant (1971), in laboratory observations of a species of *Caeculus*, demonstrated with radioactive tracers that their species of *Caeculus* also fed on fungus. Mites were collected in the field and transferred to petri dishes in the laboratory. Parts of plants containing fungal spores were placed in the dishes as a source of food. However, all captured individuals died without completing their life cycle. McDaniel (1979) only provided a description of the genus *Caeculus*. However, before the text was shortened for publication a key to each of the then described species of rake-legged mites from the United States and their distributions were included. That key and distribution data are presented here.

Caeculus lewisi, NEW SPECIES
(Figs. 1-23)

Female (Figs. 1-6) anterior border of propodosoma projecting forward over gnathosoma with six flattened crescent shaped curved setae; two pairs of lateral eyes associated with plate region of propodoso-

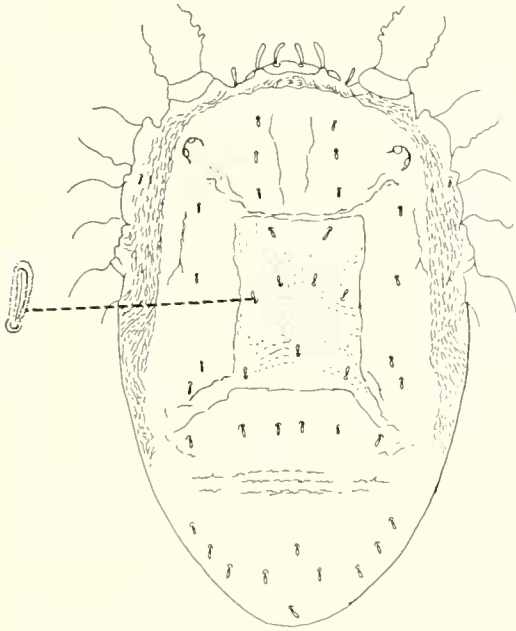


Fig. 1. *Caeculus lewisi* new species holotype female dorsal view.

ma; propodosomal plate with six spatulate setae; median dorsal plate (Fig. 1) with nine spatulate setae, plate longer than wide, anterior and posterior borders subequal; lateral median dorsal plate with four spatulate setae each, three aligned in a row vertically, fourth setae paired with third lateral plate seta near posterior border of median dorsal plate; opisthosomal transverse plates fused into single transverse plate across opisthosoma, with six spatulate setae; opisthosoma with 10 spatulate setae scattered near posterior region of opisthosoma; all dorsal spatulate setae with inner plumose region; body heavily armored, wrinkled, dark brown in color; length 1.5 mm; width between eyes 0.5 mm; propodosomal region wider than opisthosomal region; ventral area below anterior projection of propodosomal plate contains a forked prominence with two spines (Fig. 2), below this structure is a crescent-shaped groove between chelicerae; palpal tibia with single terminal claw; palpal tarsus with terminal setae; first coxa with four spatulate setae; second and third coxa

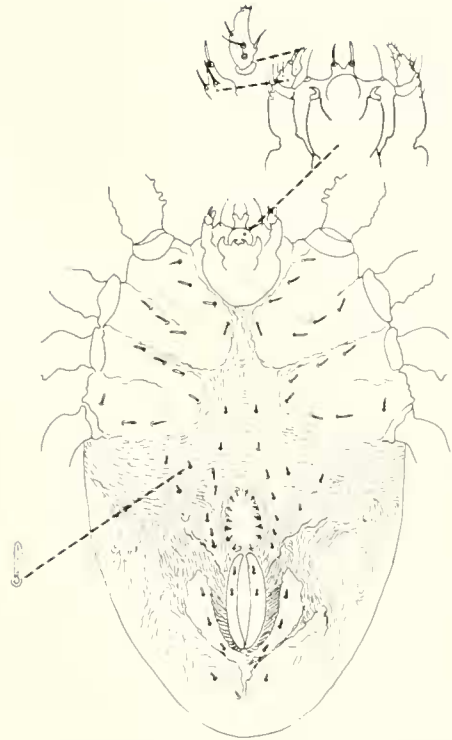
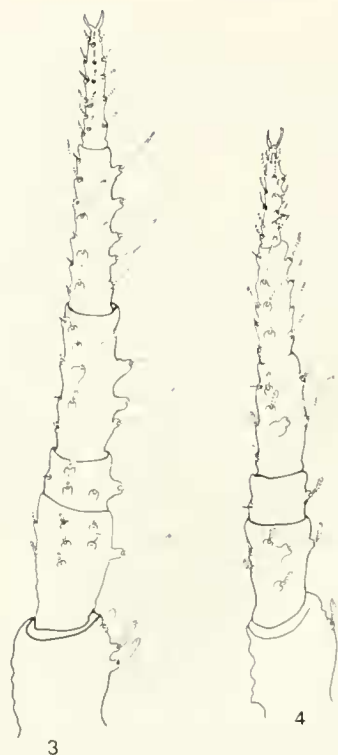


Fig. 2. *Caeculus lewisi* new species holotype female ventral view.

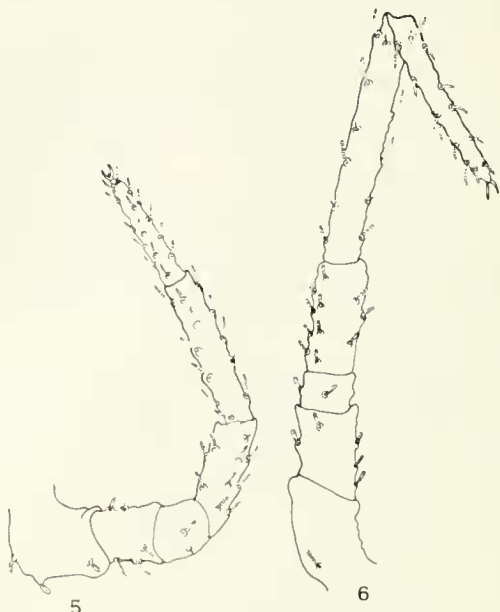
with three spatulate setae; fourth coxa with four spatulate setae; 20 setae in center of venter forming a double row starting from between fourth coxa, extending on either side of genital opening, each row with seven setae; three setae are grouped in a circle one either side of row of seven setae; genital opening with two rows of seven simple setae; anal opening with two pairs of simple setae surrounded by three simple setae on each side; opisthosomal region below anal opening with three setae; trochanter I with three large spatulate setae on anterior border and a single smaller setae; inner region with three spatulate setae; setal placement on rest of segments as shown in Fig. 3; setal placement on legs II, III, and IV as shown in Figs. 3-6.

Male (Figs. 7-12) anterior border of propodosoma similar to female projecting forward over gnathosoma with only four flat-



Figs. 3, 4. *Caeculus lewisi* new species holotype female. 1st and 2nd pair of legs.

tened crescent-shaped, curved setae; two pairs of lateral eyes similar in structure to female; propodosomal plate with six spatulate setae; median dorsal plate (Fig. 7) with seven spatulate setae, plate longer than wide similar to female; lateral median dorsal plates with three spatulate setae each; opisthosomal transverse plate fused into single transverse plate across opisthosoma with five spatulate setae; opisthosoma with 10 spatulate setae scattered near posterior region of opisthosoma; dorsal setae similar in structure to female with inner plumose region; body heavily armored, wrinkled, dark brown in color; length 1.2 mm, width between eyes 0.5 mm; opisthosoma wider than propodosomal region; ventral area below anterior projection of propodosomal plate without forked prominence found on female; two large spine-like setae located on pronounced swellings between palps and



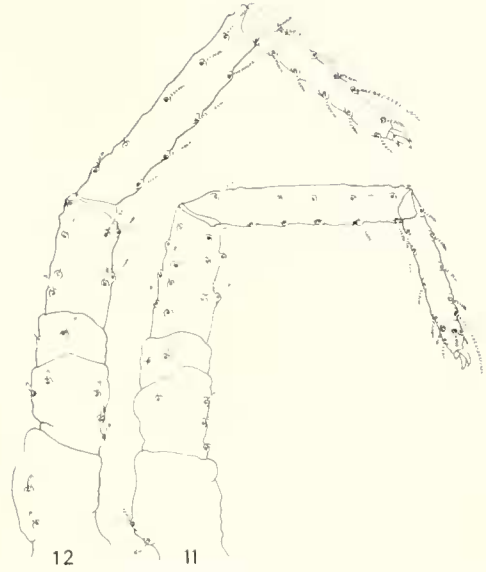
Figs. 5, 6. *Caeculus lewisi* new species holotype female. 3rd and 4th pair of legs.



Fig. 7. *Caeculus lewisi* new species allotype male dorsal view.



Fig. 8. *Caeculus lewisi* new species allotype male ventral view.



Figs. 11, 12. *Caeculus lewisi* new species allotype male 3rd and 4th pair of legs.

chelicerae; chelicerae reduced; four spatulate setae located below chelicera and between palps bases; first coxa with four spatulate setae; second and third coxa with three



Figs. 9, 10. *Caeculus lewisi* new species allotype male 1st and 2nd pair of legs.

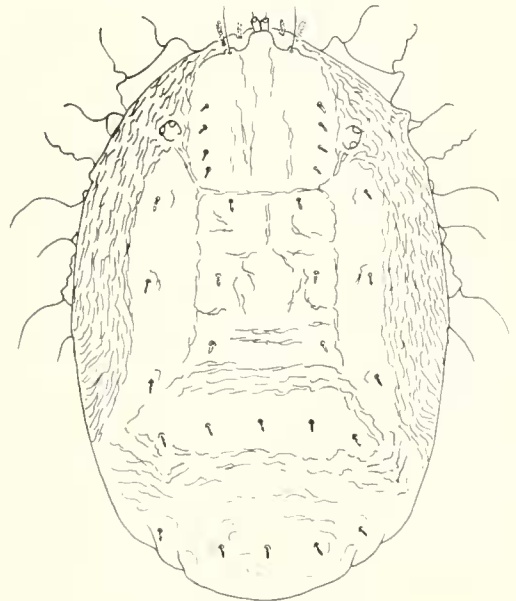


Fig. 13. *Caeculus lewisi* paratype nymph dorsal view.

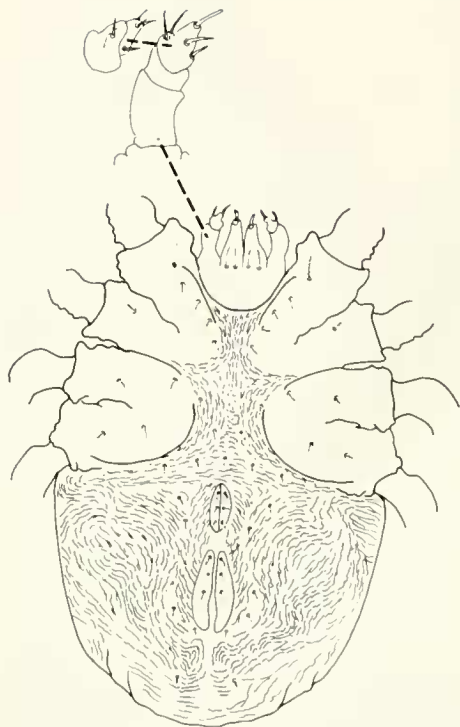
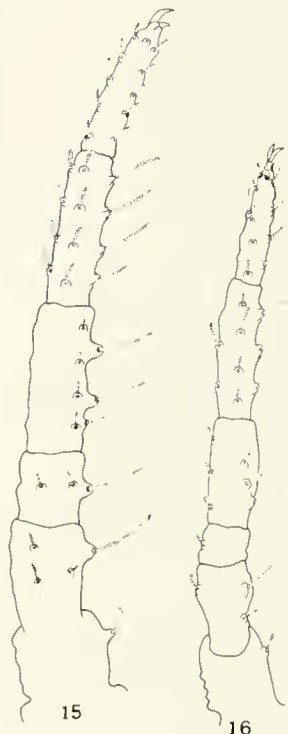


Fig. 14. *Caeculus lewisi* paratype nymph ventral view.

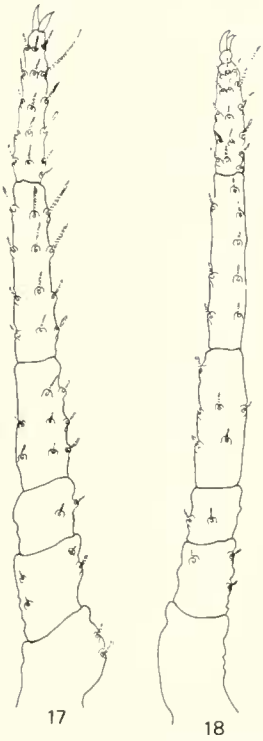


Figs. 15, 16. *Caeculus lewisi* paratype nymph 1st and 2nd pair of legs.

spatulate setae; fourth coxa with two spatulate setae; six setae in center of venter forming a transverse line below fourth coxa (Fig. 8); genital plates each with six simple setae; ten simple small setae associated with genital opening; anal opening with two pairs of setae surrounded by three simple setae; opisthosomal region below anal opening with three simple setae; trochanter I with three large spatulate setae on anterior border (Fig. 9); setal placement on rest of segments as shown in Fig. 9; setal placement on legs II, III, IV as shown in Figs. 10–12.

Nymph (Figs. 13–18), anterior border of propodosoma projecting forward over gnathosoma with four flattened crescent shaped setae; two pairs of lateral eyes associated with striated dorsal integument, two small setae are located on two finger-like projections of propodosomal plate; propodosomal plate with two simple, long, setae

on anterior portion; propodosomal plate with eight spatulate setae, all aligned in a vertical row on lateral margin; propodosomal plate about as wide as long; lateral median dorsal plate each with three spatulate setae, all aligned in a vertical row; median dorsal plate with six spatulate setae; plate longer than wide; opisthosomal transverse plates fused into single transverse plate across opisthosoma, with five spatulate setae; opisthosoma with five spatulate setae in a transverse row in posterior region of opisthosoma; ventral palpal tibia as shown in Fig. 13; first coxa with four simple setae and a single spatulate setae; second coxa with one simple seta; third and fourth coxa with two simple setae; center of venter between fused third and fourth coxa with two pairs of simple setae; a transverse row of five simple setae located below fourth coxa; a reduced genital plate with three simple



Figs. 17, 18. *Caeculus lewisi* paratype nymph 3rd and 4th pair of legs.

setae, plate surrounded by pair of simple setae on either side (Fig. 14); anal plate with three simple setae, surrounded by three simple setae on either side (Fig. 14); opisthosomal region with a pair of setae; setal placement of legs shown in Figs. 15–18.

Larva (Figs. 19–23), anterior border of propodosoma projecting forward over gnathosoma; propodosomal plate reaching to anterior border with two spatulate setae; two pairs of lateral eyes; two spatulate setae located below lateral eyes and near posterior border of propodosomal plate; eight spatulate setae aligned in two rows of four each running from posterior border of propodosomal plate to opisthosomal region; ventral palpal tibia as shown in Fig. 20; mouthparts reduced; apex of anterior region of gnathosoma with two setae; below reduced mouth parts are four simple setae; first coxa with two setae; second coxa without setae;

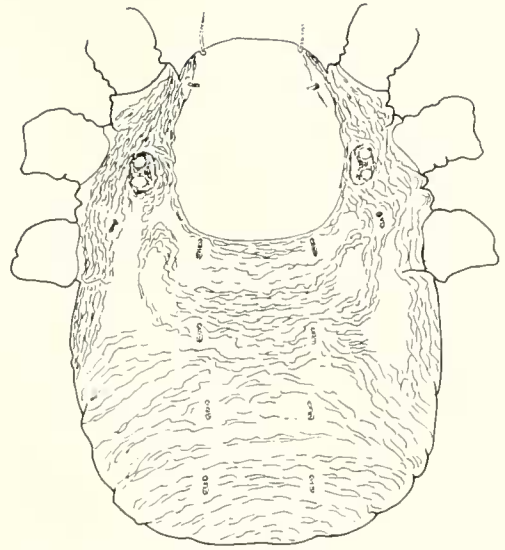


Fig. 19. *Caeculus lewisi* larva dorsal view.

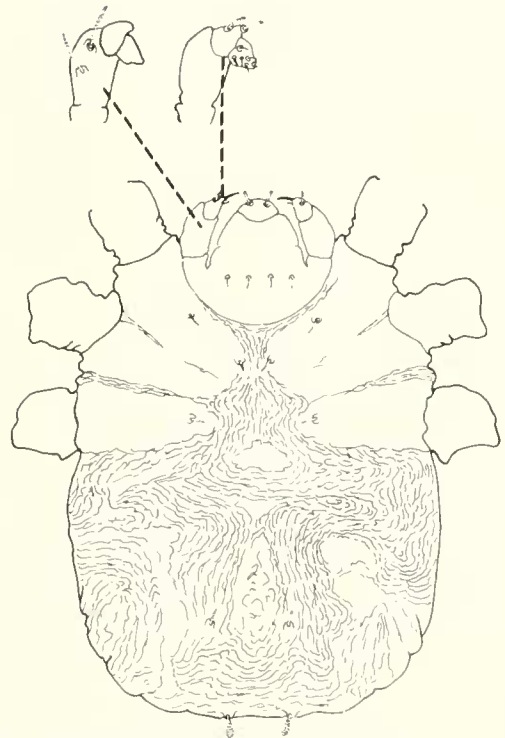
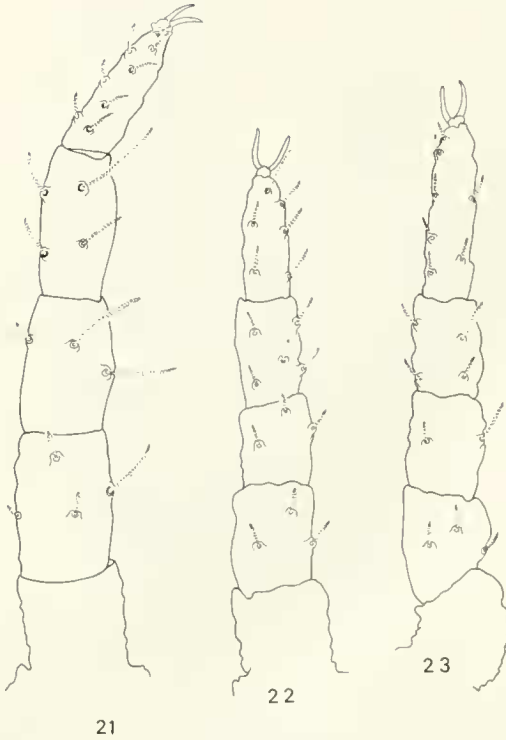


Fig. 20. *Caeculus lewisi* larva ventral view.



Figs. 21-23. *Caeculus lewisi* larval 1st, 2nd, and 3rd pair of legs.

third coxa with a single seta; venter with two pairs of setae, one pair located in posterior region of opisthosoma, other pair spatulate, located on margin of dorsal and ventral region of opisthosoma; setal placement of legs as shown in Figs. 21-23.

Female holotype collected July 16, 1972 in Butte County 10 miles north of Newell, South Dakota near Willow Creek. Allotype male, nymphs, and larvae along with 22 specimens collected at type location. The holotype and allotype along with a nymph and larva will be deposited with the USNM.

The following key constructed in 1972 from the literature was used to separate species of the genus *Caeculus*. It has been used with success to identify members of the family Caeculidae collected from Colorado, North Dakota, South Dakota, New Mexico and Texas. It is here presented for use by others that do not have access to

Mulaik (1945). Mulaik's work contains no keys, but his descriptions and figures are accurate.

1. Median dorsal hysterosomal plate with 2 pairs of spatulate setae 2
- Median dorsal hysterosomal plate with more than 2 pairs of setae 3
2. Leg I with 2 setae on femur with clavate tips, 2 on tibia, and 4 on pretarsus, all located on inner margin; outer margin seta smaller than inner margin setae and curved
 - *C. clavatus* 1905 Banks (California)
- Leg I with 2 setae on femur without clavate tips, 3 on tibia, and 4 on pretarsus, all located on inner margin; outer margin seta smaller than inner setae and curved
 - *C. americanus* Banks 1899 (California)
3. Median dorsal hysterosomal plate with 3 pairs of setae 4
- Median dorsal hysterosomal plate with more than 3 pairs of setae 9
4. Dorsal median hysterosomal plates I and II forming 2 pairs of small oval plates not connected at midline, each plate with 3 setae ...
 - *C. kerrulius* Mulaik 1945 (Texas, Utah)
- Dorsal median hysterosomal plates I and II fused into single transverse plate across opisthosomal region 5
5. First opisthosomal transverse plate with 4 setae 6
- First opisthosomal transverse plate with 5 setae 7
6. First trochanter with 3 large curved spatulate setae on anterior border; specimens normally with an incrustation of minute sand-like particles over most of body and legs
 - *C. dortheae* Mulaik 1945 (Arizona, Nevada, Texas)
- First trochanter with 2 curved setae on prominent tubercles on anterior border, one long (59 microns), club-shaped dorsomedially; without incrustation of particles
 - *C. hardyi* Mulaik and Allred 1961 (New Mexico, Texas)
7. Second opisthosomal transverse plate with 6 setae; trochanter 1 with 2 slightly curved cylindrical setae, posterior setae much longer than anterior setae; on anterior margin of femur is a single long seta, one on the patella, 3 on the tibia, and 4 on the pretarsus
 - *C. gretschii* Mulaik 1945 (Texas)
- Second opisthosomal transverse plate with 4 setae 8
8. Trochanter I with 2 pairs of setae, posterior seta straight, slender, as long as width of trochanter, anterior seta smaller, curved, clavate;

- coxa with long slender, straight seta on anterior border, anterior to seta is a small curved clavate seta; femur and patella each with one anterior seta; tibia with 2 setae, pretarsus with 4 setae *C. hypopachus* Mulaik 1945 (Texas)
- Trochanter I with a single curved spatulate seta on a prominent tubercle; femur and patella with anterior setae on tubercles; tibia with 2 setae; pretarsus with 3
9. Propodosomal plate not projecting anteriorly over the gnathosomal tubercles and not covering palps from above 10
- Propodosomal plate projects anteriorly over gnathosoma, covering gnathosomal, tubercles from above (if palps are observed it is due to mounting of specimen in a flattened position on the slide, specimens that are not on a slide will clearly show projection of propodosomal plate) 12
10. Median dorsal hysterosomal plate with 13 setae arranged in a 4-4-5 sequence; left lateral metapodosomal plate with 7 setae, 2-3-2; right lateral metapososomal plate with 6 setae, 2-2-2 *C. mexicanus* Mulaik and Allred 1961 (Texas)
- Median dorsal hysterosomal plate with less than 13 setae; left lateral metapodosomal plate with less than 7 setae; right lateral metapodosomal plate with less than 4 setae 11
11. Dorsal-lateral gnathosomal sensillae much expanded distally forming racket-like organs; posterior area of trochanter I set in slightly from edge
- *C. oregonus* Mulaik and Allred 1961 (California, Oregon)
(Higgins and Mulaik 1961 placed *C. oregonus* in the genus *Procaeculus*)
- Without above characters; left and right metapososomal plate with 5 setae; distally, posterior seta of trochanter I located on posterior edge . . . *C. brevis* Mulaik 1945 (Arizona, Texas)
12. Opisthosomal transverse plates I and II forming 2 pairs of small oval plates not connected at midline; on transverse plate I are II setae on each oval plate and a single seta near each inner margin of oval plate; transverse plate II with 5 setae on each oval plate
- *C. cremnicolus* Enns 1958 (Missouri)
- Opisthosomal transverse plates I and II fused into single transverse plates across opisthosomal region 13
13. Median dorsal hysterosomal plate setae number uneven 14
- Median dorsal hysterosomal plate setae number even 15
14. Median dorsal hysterosomal plate with seven setae; dorsal plate of cephalothorax with two clavate setae near posterior corners; second transverse abdominal plate with 6 setae, each located on prominent humps on lateral margins of this plate, with one clavate seta at midline of posterior margin of dorsum
- *C. archeri* Mulaik 1945 (Alabama, Tennessee)
- Median dorsal hysterosomal plate with 9 setae; dorsal plate of cephalothorax with 4 pairs of setae, first pair located at anterior margin, second pair near antero-lateral margin, third and fourth pair in postero-lateral region of plate *C. petiti* Nevin 1943 (Virginia)
15. Trochanter I with 2 spatulate setae on anterior and posterior border (4 setae); 10 median dorsal hysterosomal plate setae
- *C. tipus* Mulaik 1945 (Texas, Utah)
- Trochanter I with more than 4 spatulate setae on anterior and posterior border 16
16. Trochanter I with 3 spatulate setae on anterior and posterior borders (6 setae); 10 median dorsal hysterosomal plate setae; dorsal region of pretarsus without setae in midregion;
- *C. valverdius* 1945 Mulaik (Arizona, Texas)
- Trochanter I with 3 spatulate setae on anterior and 2 on posterior border (5 setae); eight median dorsal hysterosomal plate setae; dorsal region of pretarsus with setae in midregion
- *C. lewisi* n. sp. (South Dakota)

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